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Moonbounce with 10W

Tim Kirby G4VXE asks, "Can a Foundation licensee make a moonbounce contact using only 10 watts?" There is all the usual news too.

Typically, when we think about moonbounce (earth-moon-earth, EME) contacts, we think of very high power being needed as well as huge antenna systems. Until recently, it would have been very hard to envisage a UK Foundation licensee being able to make a successful EME contact, running a genuine 10W.

Excitingly though, with the availability of digital signal processing and some excellent software, along with some well-equipped stations around the world with skilled, enthusiastic and patient operators, the possibilities are much better.

It was with great pleasure then, that I heard from our good friends at the Essex DX Group about a recent 70cm (432MHz) EME contact made by **Dorothy Stanley M6EBQ** using **Tom Hackett's M0ABA** station, **Fig. 1**. The gear was 10W from a Yaesu FT-857 into a DG7YBN design 17-element Yagi.

Tom M0ABA takes up the story. "*I started watching the HB9Q logger for activity at my moonrise. Conditions were 'interesting' with some heavy fading. While I was waiting for Dorothy and her husband* ***Richard*** *to arrive, I decided to 'warm up the frequency' with* ***Bernd DL7APV****, running 5W into the 17-element Yagi. After about 20 minutes, I got the all important OOO report but, unfortunately, conditions didn't allow us to complete the contact. Maybe another time!*

"Once Dorothy arrived, she started to call DL7APV and after a few sequences, Bernd reported that he was hearing someone replying to his CQs. After a few more CQs, Dorothy and the team were very excited to see M6EBQ DL7APV JO62 OOO on the screen! After repeating RO a couple of times, the rest of the QSO went through. Bernd closed the contact by sending 'TNX QSO –22'!"

Considering that WSJT will decode signals down to –29 or –30 (this figure represents the signal strength in decibels relative to the noise level), this shows that there was plenty of signal to spare. Tom says that the best report he'd had with the Yagi before, when testing at higher power, was –24.

Congratulations to Dorothy on making what we think is the first successful EME contact by a UK Foundation licensee (unless you know differently!). Congratulations to Tom M0ABA as well, for hosting another really inspirational piece of VHF/UHF operating. Both the team at the Essex DX Group and I hope that more people will be encouraged to have a go at some simple EME operating. If you do, please let me know how you get on.

Fig. 1: A screenshot of the record breaking 432MHz moonbounce contact between M6EBQ and DL7APV.

A New Satellite to Play With: AO-91

After a successful launch a few days earlier, the Fox-1B satellite, now known as AO-91, was released for general usage on the US Thanksgiving holiday. We've got lots of information about what's been happening with it in our satellite news this month, but suffice to say that it's probably the easiest satellite to listen to. If you want to prove it, listen to the 145.960MHz downlink frequency when the satellite is around (or just leave your set monitoring, or scanning the channel) and whether you're using a collinear, a beam or even a simple handheld and rubber duck antenna, you'll almost certainly hear something. On one pass over London, just after the satellite was launched, I heard signals on my Radiooddity GD-77 dual-band DMR handheld (using the FM mode, of course) with the squelch on! It's loud. The uplink is on 435.250MHz, where you will have to adjust your transmit frequency to compensate for Doppler shift. Start off on 435.240, then 435.245, 435.250 at closest approach, 435.255 and then 435.260MHz as the satellite goes away over the horizon.

The 6m Band

Peter Taylor EA8/G8BCG has been concentrating on 6m EME from his QTH in IL39 where, he says, he discovered that despite having a minimum horizon elevation of 16° at moonrise and a fixed horizontal Yagi, he can work EME beaming into the ground! On November 5th, Peter worked JG2BRI and ZS6NK for two new initial contacts from EA8, followed by more initial contacts over the next week, including ES6EQ (DXCC 100 from EA8, well done!), OH7KM, VP8WOS

(Chris G3WOS for DXCC 101), W9JN, JA7QVI, OH6MIK and JG1TSG.

Here at **G4VXE**, I've had FT8 running most of the time and managed a nice 'tropo' contact with G3YQC (IO82). In early December, I've been monitoring MSK144 on the band – initially with short reflections from stations such as GM3NKG (IO85) and then today, December 9th, worked HG5OGI (JN97) and S59SV (JN76). It's always fun to make these contacts using the simple V2000 vertical.

The 2m Band

Jef Van Raepenbusch ON8NT (Aalter) has been operating OP8NT during November, commemorating World War 1. He says that he didn't have so much time to operate as normal because, "*I was involved in the setting up and running of an exhibition on 'the history of Radio Communication in the first World War' together with the local heritage society, city council and local parish in the Saint Mary Church in Maria-Aalter.*

"Next to the exhibition we also had a stand of our local radio club UBA-ALT under the slogan "Communicate worldwide without the help of the internet, become a ham operator!"

"We had a functioning WSPR station (5W) on HF and an indoor antenna. Also on display was my 5-element LPDA antenna for satellite work together with my ID-51 portable radio.

"We guided classes of youngsters and teachers from the local schools around the exhibition and our stand. One young girl of around 12 years asked me, "Can you really talk to astronauts in the ISS with that antenna?" *and her eyes were blinking...*

"Youngsters also got an exercise for the classroom and at home to look for our special event station OP0PPY, ***Fig. 2****, on* ***wsprnet.org*** *to see where our station was received... Afterwards we got positive feedback from teachers who were combining this exercise with geography and maths. The youngsters were really surprised and excited that a small transmitter in their local church was received worldwide!"*

On the 2m band, Jef found conditions excellent on November 1st, working 2W0JYN (IO83), M0CGL (JO03), M5AEH (JO02) and F6HPP/) (JN19). During the UK Activity Contest on November 7th, Jef found conditions poor with a number of stations heard but not worked. He did work M0DXR/P (JO01), G4ZTR (JO01), G4LDL/P (IO91), G4ODA (IO92) and G6UBM (JO01).

It's always good to hear from **Derek Brown G8ECI** (Lincolnshire) who writes,

Fig. 2: The station at OP0PPY, commemorating World War 1.

Fig. 3: A nice shot of CT1FJC's new balcony antenna system for satellites.

"I've been quite active in the recent 2m UK Activity contests and 144MHz AFS. Not too many stations worked but if I can hear them, I can work them, proving that the new antenna farm is working as expected. I may be losing up to 3dB of my transmit power in the quite long feeder runs, around 40m to the antennas, so am seriously thinking of getting the old DK1OF single 4CX250B amplifier down from the shelf where it has sat for the last 17 years! I just need to gingerly apply mains power to it, to reform the smoothers and the like. That will bring my power back to 300W at the amplifier. Perhaps 4CX250Bs are old hat nowadays but I just don't feel comfortable laying out for a solid-state power amplifier when I have 300W already proven and working.

"Highlights of the stations worked in the two contests: GI4SNA, GW8JLY, GW8ASD and many others, in a very obstructed direction from my QTH, as is most of the mainland UK, with rising ground to 300ft ASL within a few miles. In the other direction, I worked OZ1BEF in JO46 with 59 reports both ways".

Peter G8BCG had some excellent EME contacts on the band from his Cornish QTH, including YC2MDU, W5ADD, F6HEO, NH6Y, KL7UW, N0AKC, ZS5LEE, W7JW, W8KEN, SK5AA, JH1PFP, VK5APN, F6HVK, EW7AW, OK1UGA, RW3PX, DL6SH, JF3MKC, F8DO, V31EME, OH6ZZ, DL9DBJ, K0TPP, ZL3NW (Peter's best DX on 2m), W8TN, KB7IJ, OH6UW and OK1VRY. Peter had some lovely feedback from **Rich KB7IJ**, *"I've never seen a better signal from a single Yagi station!".* Peter says that his single InnovAntennas 12-element LFA Yagi obviously works. Well done – some amazing DX there, Peter.

The 70cm Band

During the UK 432MHz Activity Contest on

November 14th, Jef OP8NT worked G3XDY (JO02), G3PYE/P (JO02), G4FEV (IO92) and G4ODA (IO92).

Satellites

Jef OP8NT monitored two ISS ARISS contacts during the month, one on November 3rd, conducted by **Paulo IZ0JPA** in Italian and one on November 30th, again with Paulo IZ0JPA operating, this time in English. On November 3rd, Jef worked CT1FJC (IM57) through AO-85.

Kevin Hewitt M0GTD writes, "*I spent most of November in Chatham, Kent. During my stay I received telemetry from RadFxSat (Fox-1B) shortly after launch. I was using an Icom IC-271 with a crossed dipole for the WX band mounted in the loft and the audio connected to a PC running FoxTelem. A few days later I was monitoring 145.960MHz and heard a digitised voice announce 'Fox-1 Safe Mode'. The ISS detector Pro Android App was quick to provide preliminary pass data after launch and pass predictions once orbit was established. I also tried monitoring AO-85 for SSTV images on experimenters Wednesday and only heard a digitised voice announce 'Fox-1'.*"

Back in Gibraltar, where Kevin operates as **ZB2GI**, he continues, "*I attempted to operate via RadFxSat (Fox-1B) designated AO-91 and the westerly pass was very busy with stations in Portugal, Italy, Spain and England all easily received on the very strong 2m downlink. The Portuguese station dominated the pass and I was unable to complete a contact. The ARISS MAI-75 Slow Scan system in the Russian Service Module of the ISS transmitted SSTV images on December 6th and 7th. The PD120 RS0ISS SSTV images depicted Russian Cosmonautic anniversaries. I received six full and three partial images, twice receiving two full images on the same pass. My setup comprised an FT-817 connected via a data interface to a notebook PC running MMSSTV and a manually tracked 2m/70cm log periodic. The FT-817 signal meter was full scale during the passes. ISS detector Pro Android App provided pass predications and the direction/elevation to point the antenna".*

Mark Marment CT1FJC (Algarve) hasn't had so much time for operating this month but has made some nice contacts, **Fig. 3**, including CT8/DL7VTX (HM58), MI6GTY (IO64), 2M0SQL (IO87) and CU2ZG (HM77) using the FM satellites as well as M0NPT (IO92), G0ABI (IO80) and GM4ZJI (IO86) among others through FO-29.

Patrick Stoddard WD9EWK (Phoenix) writes, "*the launch of AO-91 was the big thing for satellite operators in the past month. It fixed the shortcomings in the uplink receiver on AO-85, and has been worked by many operators with HTs, rubber duck antennas (duckies), and milliwatt power levels – even down to 50mW from a Kenwood TH-D72, or 100mW from a Yaesu VX-3. Over here, I have heard many operators who are giving satellite operating a try for the first time and others who were active years ago when AO-27 and AO-51 were on the air. The footprint, larger than we currently have with AO-85 or SO-50, has also helped to increase activity. From my front yard, I have made AO-91 QSOs when the satellite was only 3° to 5° above the horizon – a good demonstration of how well the satellite's uplink receiver works, coupled with the downlink transmitter operating at 500mW to almost 700mW on 145.960MHz.*

"Once AO-91 was opened up to amateurs on Thanksgiving Day here in the USA (November 23rd), the daytime passes have been busy. The larger footprint means that more stations in the continental USA and Canada were able to work stations in Central America and even the northern parts of South America. The recent HC8LUT Galapagos DXpedition included AO-91 with other satellites they worked, making more operators happy with FM satellite QSOs. By comparison, the night time passes have been less crowded and these have been times for many to experiment with less-than-ideal stations.

"I have done a fair bit of late-night experimenting, starting with the four-day Thanksgiving holiday weekend. Here is my list of radio/antenna combinations I have used with AO-91:

- *Icom IC-2730 and Elk log periodic (full-duplex, also varying transmit power)*
- *Kenwood TH-D72 and Elk log periodic (full-duplex)*
- *Kenwood TH-D74 and MFJ 2m/70cm long duckie*
- *Wouxun KG-UV9D and MFJ 2m/70cm long duckie (full-duplex)*
- *Yaesu VX-3 and Elk log periodic*
- *Yaesu VX-3 and MFJ 2m/70cm long duckie (varying transmit power between 100mW & 1W)*
- *Baofeng UV-5R and Diamond SRJ77CA long duckie*

"I have also worked some AO-91 passes with combinations of two radios – for example, my IC-2730 and SDRplay RSP1 connected through a diplexer to my Elk log periodic, or a TH-D74 for the uplink and a 30-year-old Kenwood TH-215 for the downlink – using long duckies on each HT. Hearing the AO-91 downlink with HTs and their standard duckies also works on higher passes and I have seen some reports of QSOs being made that way. As with AO-85, the Chinese-made HTs that advertise crossband or full-duplex operation appear to work fine with AO -91. I have already tried my Wouxun KG-UV9D and I expect the others that I successfully tested with AO-85 in 2015, including the Wouxun KG-UV8D and Anytone TERMN-8R - would also work fine with AO-91 full-duplex.

"I had an AMSAT table at the Superstition 'Superfest Hamfest', not far from my house, on December 2nd. Since AO-85's launch in 2015, followed by the recent AO-91 launch, satellites were a popular topic at this Hamfest. I had some demonstrations during the Hamfest on different satellites, including these two and others such as FO-29 and CAS-4B. Hams watching my demonstrations were able to listen to AO-85 and AO-91 on their own HTs, or on some HTs I had at my table. I still had an external speaker connected to the radios I used for the demonstrations, but it is always better when the hams are able to hear the FM satellite downlinks on their own equipment.

"Besides the AO-91 excitement, we have had some SSTV from the ISS. The MAI-75 test didn't cover passes over Arizona but there was some worldwide ARISS SSTV before the MAI-75 test. I recorded the transmissions with my TH-D74, then transferred the recordings from the HT to my tablet and decoded them using RX-SSTV. I had some really good pictures, including one when the ISS passed directly over my head on a Wednesday evening pass during the transmission. The daytime passes I monitored had some noise, which came from a Russian voice announcing where the ISS was passing over at that moment. Those announcements weren't present in the transmissions I heard in the evening."

Graham Jones G3VKV (Cheltenham) has been using AO-91 too, for some nice contacts. On November 30th, Graham worked N1AIA in Maine on a sub-2° elevation pass and on December 8th, he worked N1AIA again as well as TF8KY.

Finally

Thanks for all your news this month. I must say it's full of the sort of operating that fascinates me – making me want to go outside (it's currently –2°C here), assemble some antennas and point them at the sky! I hope you want to go outside and put antennas up too – but don't freeze! See you next month.